Patent
266/047

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	Group Art Unit: Unknown
Charles J. Lindsay, et al.	Examiner: Not Yet Assigned
Serial No.: Not Yet Assigned	
Filed: November 9, 2001	
For: COMMUNICATION SYSTEM WITH FAST CONTROL TRAFFIC	

PRELIMARY AMENDMENT

Box Patent Application
Commissioner for Patents
Washington, DC 20231

Dear Sir:

This Preliminary Amendment is for placing the subject application in better condition for allowance. Please consider the subject application with the following amendments to the specification and claims.

IN THE SPECIFICAION

Please amend the specification as follows:

Insert the following paragraph to page 1, between line 7 and line 8:

This application is a divisional of U.S. Patent Application Serial No. 09/122,565 filed on July 24, 1998.

Replace the paragraph on page 3, between line 12 and line 21, with:

In at least one mobile communication system, however, a user station can establish initial communication using the same channel used for transmitting bearer traffic. For example, a system in which a user station can establish communication by exchanging control traffic messages in a particular communication channel (e.g., a time slot of a time frame), and thereafter use the same channel (time slot) for bearer traffic, is described in U.S. Patent 6,088,590, which is assigned to the assignee of the present invention, and hereby incorporated by reference as if set forth fully herein.

Replace the paragraph on page 4, between line 4 and line 11, with:

In some mobile communication systems, the user station plays a larger role in handoff. An example of such a system is generally described in U.S. Patent 6,088,590, previously incorporated herein by reference. In at least one embodiment disclosed therein, the user station not only determines when

to hand off, but also takes steps to initiate a hand off from its current base station to a different base station.

Replace the paragraph on page 12, between line 16 and line 27, with:

The communication system may also be based on a GSM network interconnection. Figure 2A is a diagram of a communication system architecture showing such an interconnection. In the communication system shown in Fig. 2A, the base stations 104 may connect to a GSM mobile switching center 112 through a GSM "A" interface. The "A" interface may be incorporated in base station controllers 105 and in intelligent base stations 107. Features and functionality of GSM may be passed to and from the base stations 104 over the "A" interface in a manner that is transparent to the end user (i.e., user stations 102). The GSM mobile switching center 112 may connect to a PSTN or to other networks, as indicated in Fig. 2A.

Replace the paragraph on page 15, between line 6 and line 17, with:

In some embodiments, a user station 102 may communicate in more than one time slot 302 in each time frame 301, so as to support an increased data rate. Similarly, in some embodiments, a user station 102 may periodically skip time frames 301 and communicate in some subset of all time frames 301 (e.g., every other time frame 301, or every fourth time frame 301), so as to support a reduced data rate where a full speed communication link is not necessary. Further information about an exemplary TDMA system supporting variable

data rates as described above may be found in U.S. Patent 6,088,590, previously incorporated herein by reference.

Replace the paragraph on page 17, between line 8 and line 11, with:

Further details regarding time frame structures (including virtual time slots) may be found in U.S. Patent 6,005,856, hereby incorporated by reference as if set forth fully herein.

Replace the paragraph on page 20, between line 10 and line 15, with:

Further details regarding means for establishing communication (particularly spread spectrum communication) in a TDMA system may be found in U.S. Patent 5,455,822 and in U.S. Patent 6,088,590, both of which are hereby incorporated by reference as if fully set forth herein.

Replace the paragraph on page 45, between line 18 and line 20, with:

The base station 104 sends a Set Service (CT-SET) control traffic message to the user station 102 when the base station 104 wishes to change the characteristics of over-the-air service.

Replace the paragraph on page 55, between line 19 and line 30, with:

An exemplary message flow diagram for processing a call originating from the network and terminating at a user station 102 is shown in Fig. 10. In Fig. 10, messages are shown

abstractly by arrows, similar to Fig. 9, between a user station 102 (abbreviated "MS") and a base station 104 (abbreviated "BS"), between the base station 104 and a base station controller 105 (abbreviated "BSC"), and between the base station controller 105 and a mobile switching center 112 (abbreviated "MSC"). Control traffic messages between the user station 102 and the base station 104 are typically preceded by the initials "CT" in Fig. 10. The steps numbered 1 through 33 associated with the arrows appearing in Fig. 10 are explained below:

Replace the paragraph between page 62, line 24, and page 63, line 5, with:

Figures 11A-11C and 12A-12B are message flow diagrams for an intra-cluster handover and an inter-cluster handover, respectively. These message flow diagrams may be explained with reference to Fig. 19, which illustrates a particular deployment of base station clusters. In Fig. 19, a mobile switching center 120 is connected to a plurality of base station controllers 105 (also referred to as cluster controllers). Each base station controller 105 is in turn connected to a plurality of base stations 104. The base stations 104 are organized into logical groups of clusters 121, such that each cluster 121 of base stations 104 is connected to a single base station controller 105. A cluster 121 of base stations 104 need not be geographically adjacent; rather, the cluster 121 comprises a logical group of base stations 104 regardless of their geographical proximity.

Replace the paragraph on page 88, between line 11 and line 26, with:

As an example, a user station 102 may be set to operate on a plurality of frequencies between 1850 and 1990 MHz, with the frequencies separated in 625 kHz steps. Each user station 102 may be equipped with a frequency synthesizer that may be programmed to allow reception and/or transmission on any one of the plurality of frequencies. If the user station 102 operates solely in a licensed PCS band (e.g., 1850 MHz to 1990 MHz), the programmable frequency steps may be in 5 MHz increments, in which case the first channel may be centered at 1852.5 MHz, the next at 1857.5 MHz, and so on. If operating in the isochronous band between 1920 and 1930 MHz, the first channel may be centered at 1920.625 MHz, and the channel spacing may be 1.25 MHz across the remainder of the isochronous band. The user stations 102 may or may not be configured to operate in the 1910 to 1920 MHz band, which at present is set apart in the United States for asynchronous unlicensed devices.

Replace the paragraph on page 88, between line 27 and line 30, with:

Further information regarding dual-mode and/or dual-band communication is set forth in U.S. Patent 5,790,587, hereby incorporated by reference as if set forth fully herein.

Replace the paragraph between page 88, line 31, and page 89, line 11, with:

In one embodiment, a communication protocol provides channel information to a base station to select an antenna for

communication with a user station 102. Further, the protocol provides for output power adjustment in a user station 102 and a base station 104. A preferred power adjustment command from the base station 104 to the user station 102 may be encoded according to Table 8-2 appearing earlier herein. Although preferred values are provided in Table 8-2, the number of power control command steps and the differential in power adjustment between steps may vary depending upon the particular application and the system specifications. Further information regarding antenna diversity and power adjustment technique may be found in U.S. Patent 6,085076, hereby incorporated by reference as if set forth fully herein.

IN THE CLAIMS

Please amend the claims as follows:

Cancel the originally filed claims 1-29.

Amend claims 30-34 as follows:

30. (Once Amended) In a time division multiple access communication system in which a time frame is divided into a plurality of time slots, a method of communication comprising the steps of:
communicating between a user station and a first base station; and
exchanging a plurality of control traffic messages between said user station and a second base station during a multiple of time slots of a single time

frame to hand off said user station from said first base station to said second base station.

31. (Once Amended) The method of claim 30, further comprising the step of establishing a duplex communication link between said user station and said second base station after said step of exchanging a plurality of control traffic messages.

32. (Once Amended) The method of claim 31, further comprising the step of assigning a time slot for bearer communication between said user station and said second base station in response to said step of exchanging a plurality of control traffic messages.

33. (Once Amended) The method of claim 32, further comprising the step of transmitting bearer traffic messages between said user station and said second base station during said time slot assigned for bearer communication.

34. (Once Amended) The method of claim 30, wherein said step of exchanging a plurality of control traffic messages between said user station and said second base station comprises the step of transmitting a next slot pointer in each of said plurality of control traffic messages transmitted from said second base station to said user station.

Add the following new claims to the subject application:

35. (New) The method of claim 30, wherein the step of exchanging a plurality of control traffic messages includes the steps of:

transmitting, in a user transmission interval of a time slot of said multiple of time slots in said single time frame, a user control traffic message from said user station to said base station; and

transmitting, in a base transmission interval of said time slot of said multiple of time slots in said single time frame, a base control traffic message from said base station to said user station.

36. (New) A time division multiple access (TDMA) communication system, comprising a plurality of base stations and a user station, said plurality of base stations generating a series of time frames each divided into a plurality of time slots, wherein:

said user station communicates with a first one of said plurality of base stations;

said user station exchanges a plurality of control traffic messages with a second one of said plurality of base stations while communicating with said first base station; and

said user station communicates with said second base station and discontinues communicating with said first base station after exchanging said plurality of control traffic messages with said second base station.

37. (New) The TDMA communication system of claim 36, wherein said second base station establishes a duplex communication link with said user station in response to said user station exchanging said plurality of control traffic messages with said second base station.

38. (New) The TDMA communication system of claim 37, wherein said second base station further assigns a time slot for bearer communication between said user station and said second base station in response to said user station exchanging said plurality of control traffic messages with said second base station.

39. (New) The TDMA communication system of claim 38, wherein said user station and said second base station further transmit bearer traffic messages there between during said time slot assigned for bearer communication.

40. (New) The TDMA communication system of claim 36, wherein at least one of said plurality of control traffic messages transmitted to said user station includes a next slot pointer.

41. (New) The TDMA communication system of claim 36, wherein:
said user station transmits, in a user transmission interval of a time slot of said plurality of time slots in a time frame, a user control traffic message to said base station; and

said base station transmits in response to said user control traffic message, in a base transmission interval of said time slot of said plurality of time slots in said time frame, a base control traffic message to said user station.

42. (New) In a communication system that establishes a continuous sequence of time frames with each time frame divided into a plurality of time slots, a communication process comprising the steps of:
communicating between a user station and a first base station using a first plurality of time slots;
exchanging a plurality of control traffic messages between said user station and a second base station during a second plurality of time slots;
communicating between said user station and said second base station using said second plurality of time slots; and
discontinuing communication between said user station and said first base station.

43. (New) The communication process of claim 42, further comprising the step of establishing a duplex communication link between said user station and said second base station after said step of exchanging a plurality of control traffic messages.

44. ((New) The communication process of claim 43, further comprising the step of assigning a time slot in said second plurality of time slots for bearer communication between said user station and said second base station in

response to said step of exchanging a plurality of control traffic messages.

45. (New) The communication process of claim 44, further comprising the step of transmitting bearer traffic messages between said user station and said second base station during said time slot assigned for bearer communication.

46. (New) The communication process of claim 42, wherein said step of exchanging a plurality of control traffic messages between said user station and said second base station includes the step of transmitting a next slot pointer in one of said plurality of control traffic messages transmitted from said second base station to said user station, said next slot pointer pointing to a subsequent time slot in said second plurality of time slots.

47. (New) The communication process of claim 46, wherein said step of exchanging a plurality of control traffic messages between said user station and said second base station further includes the step of transmitting a subsequent one of said plurality of control traffic messages from said user station to said second base station in said subsequent time slot.

48. (New) The communication process of claim 42, wherein the step of exchanging a plurality of control traffic messages includes the steps of:

transmitting, in a user transmission interval of a time slot of said second plurality of time slots, a user control traffic message from said user station to said base station; and

transmitting, in a base transmission interval of said time slot of said second plurality of time slots, a base control traffic message from said base station to said user station.

49. (New) The communication process of claim 30, further comprising the steps of:

terminating a call between said user station and a network through said first base station in response to the step of discontinuing communication between said user station and said first base station; and

establishing said call between said user station and said network through said second base station.

REMARKS

In the originally filed U.S. Patent Application Serial No. 09/122,565, the claims were subject to a three-way Restriction Requirement under 35 U.S.C. §121 into Group I (Claims 1-17 and 26-29), Group II (Claims 18-25), and Group III (Claims 30-34). Applicant elected Group I for further prosecution in the originally filed application. Applicant also filed a Divisional U.S. Patent Application Serial No. 09/503,981 that included the claims directed to Group II (Claims 18-25) of the invention. In this application, Applicant submits the claims directed to Group III of the invention for prosecution.

By this preliminary amendment, the specification has been amended to update the reference information and correct typographic errors. A marked up version of amended paragraphs in the specification is presented in APPENIX A. In addition, claims 1-29, which are directed to Group I and Group II of the invention, have been canceled. Claims 30-34 have been amended, and new claims 35-49 have been added. Claims 30-49 are now pending in the subject application. A marked up version of amended claims 30-34 is presented in APPENDIX B.

It is respectfully submitted that claims 30-34 are amended for correct informalities. The amendments are not made for the patentability of claims 30-34 on merits. The amendments do not change the scopes of claims 30-34.

CONCLUSION

It is believed that applicant's claims 30-49 are allowable and the subject application is now in condition for allowance. Such Action is earnestly and respectfully requested.

Should the Examiner have any questions or comments, he is invited to call the undersigned representative of Applicants at (408) 993-1555.

Respectfully submitted,

LYON & LYON LLP

Dated: November 9, 2001 By: _____

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APPENDIX A

Marked Up Version of Amended Paragraphs

The paragraph on page 3, between line 12 and line 21:

In at least one mobile communication system, however, a user station can establish initial communication using the same channel used for transmitting bearer traffic. For example, a system in which a user station can establish communication by exchanging control traffic messages in a particular communication channel (e.g., a time slot of a time frame), and thereafter use the same channel (time slot) for bearer traffic, is described in U.S. Patent [Application Ser. No. 08/284,053 filed August 1, 1994,] 6,088,590, which is assigned to the assignee of the present invention, and hereby incorporated by reference as if set forth fully herein.

The paragraph on page 4, between line 4 and line 11:

In some mobile communication systems, the user station plays a larger role in handoff. An example of such a system is generally described in U.S. Patent [Application Ser. No. 08/284,053] 6,088,590, previously incorporated herein by reference. In at least one embodiment disclosed therein, the user station not only determines when to hand off, but also takes steps to initiate a hand off from its current base station to a different base station.

The paragraph on page 12, between line 16 and line 27:

The communication system may also be based on a GSM network interconnection. Figure 2A is a diagram of a communication system architecture showing such an interconnection. In the communication system shown in Fig. 2A, the base stations 104 may connect to a GSM mobile switching center 112 through a GSM "A" interface. The "A" interface may be incorporated in base station controllers 105 and in intelligent base stations 107. Features and functionality of GSM may be passed to and from the base stations 104 over the "A" interface in a manner that is transparent to the end user (i.e., user stations 102). The GSM mobile switching center 112 may [conect] connect to a PSTN or to other networks, as indicated in Fig. 2A.

The paragraph on page 15, between line 6 and line 17:

In some embodiments, a user station 102 may communicate in more than one time slot 302 in each time frame 301, so as to support an increased data rate. Similarly, in some embodiments, a user station 102 may periodically skip time frames 301 and communicate in some subset of all time frames 301 (e.g., every other time frame 301, or every fourth time frame 301), so as to support a reduced data rate where a full speed communication link is not necessary. Further information about an exemplary TDMA system supporting variable data rates as described above may be found in [copending] U.S. Patent [Application Serial No. 08/284,053 filed August 1, 1994] 6,088,590, previously incorporated herein by reference.

The paragraph on page 17, between line 8 and line 11:

Further details regarding time frame structures (including virtual time slots) may be found in [copending] U.S. Patent [Application Serial No. 08/668,483 filed June 21, 1996] 6,005,856, hereby incorporated by reference as if set forth fully herein.

The paragraph on page 20, between line 10 and line 15:

Further details regarding means for establishing communication (particularly spread spectrum communication) in a TDMA system may be found in [copending] U.S. Patent [No.] 5,455,822 and in [copending] U.S. Patent [Application Serial No. 08/284,053 filed August 1, 1994] 6,088,590, both of which are hereby incorporated by reference as if fully set forth herein.

The paragraph on page 45, between line 18 and line 20:

The base station 104 sends a Set Service (CT-SET) control traffic message to the user station 102 when the base station 104 wishes to [changes] change the characteristics of over-the-air service.

The paragraph on page 55, between line 19 and line 30:

An exemplary message flow diagram for processing a call originating from the network and terminating at a user station 102 is shown in Fig. 10. In Fig. 10, messages are shown abstractly by arrows, similar to Fig. 9, [messages] between a user station 102 (abbreviated "MS") and a base station 104 (abbreviated "BS"), between the base station 104 and a base station controller 105 (abbreviated "BSC"), and between the

base station controller 105 and a mobile switching center 112 (abbreviated "MSC"). Control traffic messages between the user station 102 and the base station 104 are typically preceded by the initials "CT" in Fig. 10. The steps numbered 1 through 33 associated with the arrows appearing in Fig. 10 are explained below:

The paragraph between page 62, line 24, and page 63, line 5:

Figures 11A-11C and 12A-12B are message flow diagrams for an intra-cluster handover and an inter-cluster handover, respectively. These message flow diagrams may be explained with reference to Fig. 19, which illustrates a particular deployment of base station clusters. In Fig. 19, a mobile switching center [112] 120 is connected to a plurality of base station controllers 105 (also referred to as cluster controllers). Each base station controller 105 is in turn connected to a plurality of base stations 104. The base stations 104 are organized into logical groups of clusters 121, such that each cluster 121 of base stations 104 is connected to a single base station controller 105. A cluster 121 of base stations 104 need not be geographically adjacent; rather, the cluster 121 comprises a logical group of base stations 104 regardless of their geographical proximity.

The paragraph on page 88, between line 11 and line 26:

As an example, a user station 102 may be set to operate on a plurality of frequencies between 1850 and 1990 MHz, with the frequencies separated in 625 kHz steps. Each user station 102 may be equipped with a frequency synthesizer that may be programmed to allow reception and/or transmission on any one

of the plurality of frequencies. If the user station 102 operates solely in a licensed PCS band (e.g., 1850 MHz to 1990 MHz), the programmable frequency steps may be in 5 MHz increments, in which case the first channel may be centered at 1852.5 MHz, the next at 1857.5 MHz, and so on. If operating in the isochronous band between 1920 and 1930 MHz, the first channel may be centered at 1920.625 MHz, and the channel spacing may be 1.25 MHz across the remainder of the isochronous band. The user stations 102 may or may not be configured to operate in the 1910 to 1920 MHz band, which at present is set apart in the United States for asynchronous unlicensed devices.

The paragraph on page 88, between line 27 and line 30:

Further information regarding dual-mode and/or dual-band communication is set forth in U.S. Patent [Application Serial No. 08/483,514 filed on June 7, 1995] 5,790,587, hereby incorporated by reference as if set forth fully herein.

The paragraph between page 88, line 31, and page 89, line 11:

In one embodiment, a communication protocol provides channel information to a base station to select an antenna for communication with a user station 102. Further, the protocol provides for output power adjustment in a user station 102 and a base station 104. A preferred power adjustment command from the base station 104 to the user station 102 may be encoded according to Table 8-2 appearing earlier herein. Although preferred values are provided in Table 8-2, the number of power control command steps and the differential in power adjustment between steps may vary depending upon the

particular application and the system specifications. Further information regarding antenna diversity and power adjustment technique may be found in [copending] U.S. Patent [Application Serial No. 08/826,773 filed on April 7, 1997] 6,085076, hereby incorporated by reference as if set forth fully herein.

APPENDIX B

Marked up Version of Amended Claims

30. (Once Amended) In a time division multiple access communication system in which a time frame is divided into a plurality of time slots, a method of communication comprising the steps of:

communicating between a [mobile] user station and a first base station; and

[handing off communication from said first base station to a second base station, said step of handing off communication comprising the step of] exchanging a plurality of control traffic messages between said [mobile] user station and [said] a second base station during a multiple of time slots of a single time frame to hand off said user station from said first base station to said second base station.

31. (Once Amended) The method of claim 30, further comprising the step of establishing a duplex communication link between said [mobile] user station and said second base station [as a result of] after said step of exchanging [said] a plurality of control traffic messages.

32. (Once Amended) The method of claim 31, further comprising the step of assigning a time slot for bearer communication [to] between said [mobile] user station [as a result of] and said second base station in response to

said step of exchanging [said] a plurality of control traffic messages.

33. (Once Amended) The method of claim 32, further comprising the step of [exchanging] transmitting bearer traffic messages between said [mobile] user station and said second base station during said time slot assigned for bearer communication.

34. (Once Amended) The method of claim 30, wherein said step of exchanging a plurality of control traffic messages between said [mobile] user station and said second base station [during multiple time slots of a single time frame] comprises the step of transmitting a next slot pointer in each of said plurality of control traffic [message] messages transmitted from said second base station to said [mobile] user station.